

DOCKET NO: 271729US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
JEAN-PIERRE CATINAT, ET AL. : EXAMINER: JOHN MABRY
SERIAL NO: 10/534,502 :
FILED: SEPTEMBER 19, 2005 : GROUP ART UNIT: 1625
FOR: PROCESS FOR THE :
MANUFACTURE OF 1,2-EPOXY-3-
CHLOROPROPANE

REPLY BRIEF UNDER 37 CFR § 41.41

This Reply Brief is timely filed on September 24, 2009, with no extensions of time, in response to the Examiner's Answer (Ans.) filed July 24, 2009. The Reply Brief is directed to the erroneous statements in the Examiner's Answer.

STATUS OF CLAIMS

Claims 1-10 have been CANCELLED.

Claims 11-26 stand finally REJECTED under 35 U.S.C. § 103(a).

Claims 11-26 are APPEALED.

The final rejection of Claims 11-26 under 35 U.S.C. § 103(a) is APPEALED.

The rejection of Claims 11-20 for obviousness-type double-patenting is withdrawn by the Examiner (Ans., p. 1, (4) Status of Amendments After Final).

STATUS OF AMENDMENTS

Applicant filed an amendment under 37 C.F.R. § 1.116 on July 7, 2008. In an Advisory Action dated December 4, 2008, the Examiner indicated that the amendment was entered but the Declaration under 37 CFR § 1.132 of co-inventor Jean-Pierre Catinat, dated July 4, 2008, filed with the amendment, was not entered. However, the Examiner's Answer now suggests that the evidence in the declaration, at least to the extent the evidence in the declaration is presented on pages 7-9 of the Specification, has been considered (Ans., pp. 6-8).

GROUND OF REJECTION TO BE REVIEWED

1. The rejection of Claims 11-26 under 35 U.S.C. 103(a) over Strebel (Strebel, et al., U.S. 6,288,248 B1, issued Sept. 11, 2001) in view of Nakanishi (JP 04-327582, published Nov. 17, 1992) and Gilbeau (U.S. 6,063,941, issued May 16, 2000).
2. The rejection of Claim 15 under 35 U.S.C. 103(a) over Strebel in view of Nakanishi and Gilbeau.

ARGUMENT

1. The rejection of Claims 11-26 under 35 U.S.C.
§ 103(a) over Strebelle in view of Nakanishi and Gilbeau

The Examiner's Answer includes the following clearly erroneous finding (Ans., p.4, 1st ¶):

It is well known in the art that it is advantageous to control acidity of this reaction at a pH range of, preferably, 2 to 8 as described by Gilbeau et al (see entire disclosure in particular column 3, lines 34-53).

When the Examiner referred to "this reaction" at page 4, paragraph 1, of the Answer, the Examiner was referring to the reaction of allyl chloride and hydrogen peroxide to make 1,2-epoxy-3-chloropropane as described on page 3 of the Answer which proceeds in an epoxidation medium comprising at least one liquid phase and in the presence of a zeolite catalyst. While Applicant agrees that Strebelle teaches a process for manufacturing 1,2-epoxy-3-chloropropane by reacting allyl chloride with a peroxide compound in the presence of a zeolite catalyst and a solvent such as methanol, and further agrees that Nakanishi teaches the desirability of using an allyl chloride with a 1,5-hexadiene content below 1000ppm to efficiently prepare high purity epichlorohydrin, the Examiner clearly erred in finding that Gilbeau would have taught persons having ordinary skill in the art to control the acidity of "this reaction" at a pH range of 2 to 8. Gilbeau does not teach persons having ordinary skill in the art, or otherwise show that it was well known in the art, to the control acidity of "this reaction" at a pH range of 2 to 8.

The claimed process controls and maintains the pH of the liquid phase of the epoxidation medium "at a value of greater than or equal to 1.5 and less than 4.8" during the reaction between allyl chloride and hydrogen peroxide in the presence of a zeolite catalyst. As a result, Applicant achieves a high level of specificity of the reaction for 1,2-epoxy-3-chloropropane and retention of the catalytic activity of the zeolite catalyst.

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Gilbeau describes “a process for the regeneration of catalysts” which are used and spent in reactions between hydrogen peroxide and allyl chloride (Gilbeau, col. 1, ll. 9-12). According to Gilbeau, “the activity of these catalysts rapidly falls” (Gilbeau, col. 1, l. 22-24) during these reaction processes (Gilbeau, col. 3, ll. 44-56). The used or spent catalysts must be regenerated before further use (Gilbeau, col. 1, ll. 9-12). Gilbeau describes a zeolite catalyst regeneration process (Gilbeau, col. 1, ll. 34-36 and 51-64). The purpose of Gilbeau’s inventive process is to regenerate used or spent zeolite catalyst. Gilbeau’s regeneration treatment refers to a process for regenerating used or spent catalyst (Gilbeau, col. 2, ll. 15-18).

Gilbeau’s catalyst “regeneration treatment” is performed at temperatures from 50 to 100°C (Gilbeau, col. 2, ll. 55-56) for a time between 10 minutes to 2 hours (Gilbeau, col. 2, ll. 64-67). Gilbeau teaches (Gilbeau, col. 3, ll. 26-43; emphasis added):

The process according to the invention makes it possible to restore virtually all the initial activity of the catalyst by a treatment of short duration.

It can be advantageous to control the pH during the treatment. This is because this makes it possible to prevent corrosion of the equipment used for the treatment. In addition, this makes it possible, when the catalyst is dispersed in a binder, to prevent attack on the binder by acids released during the treatment. Controlling the pH also makes it possible to limit the decomposition of the oxidizing agent by metals released during the treatment. . . .

When Gilbeau refers to the “treatment”, Gilbeau is referring to a treatment for regenerating used or spent zeolite catalyst. Gilbeau’s teaching to control and maintain pH relates to a catalyst regenerating treatment and not to a process of preparing epichlorohydrin. With reference to its catalyst regeneration treatment process, Gilbeau teaches (Gilbeau, col. 3, ll. 36-43):

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Generally, the pH is maintained at a value of at least 2, in particular of at least 4. The pH usually does not exceed 8, preferably 7. This is because alkaline pH values can affect the activity of the catalyst. The treatment is preferably carried out at a pH maintained in the range from 2 to 8, more particularly from 4 to 7. The pH can be controlled by addition of alkali, for example of sodium hydroxide.

The Examiner refuses to acknowledge that Gilbeau's teaching to control and maintain pH relates to a used or spent catalyst regeneration treatment and not to a process for preparing epichlorohydrin by reacting allyl chloride with hydrogen peroxide in the presence of a catalyst. The Examiner's clearly erroneous finding appears to be the primary basis for the erroneous conclusion of obviousness.

The Examiner also finds that "Strebelle clearly discloses the affect . . . an acid (pH) would have on the catalyst for re-use and regeneration of the catalyst." That teaching appears to be a restatement of Gilbeau's invention. However, there is no support in either reference for the Examiner's erroneous allegation that teaching in Gilbeau or Stebelle to control and maintain pH during the catalyst regeneration treatment process would have led persons having ordinary skill in the art to control and maintain pH during the process for producing 1,2-epoxy-3-chloropropane (Ans., p. 5). Neither Strebelle nor Nakanishi suggests that pH is a factor when reacting allyl chloride and hydrogen peroxide in an epoxidation medium comprising at least on liquid phase in the presence of a zeolite catalyst.

Because the applied prior art does not suggest that pH is a factor when reacting allyl chloride and hydrogen peroxide in an epoxidation medium comprising at least on liquid phase in the presence of a zeolite catalyst, there would have been no incentive for persons having ordinary skill in the art to optimize pH during that reaction. *See In re Antonie*, 559 F.2d 618, 620 (CCPA 1977); *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003).

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The Examiner also clearly erred in finding a correlation between controlling pH during Gilbeau's process for regenerating used or spent catalyst and controlling pH in Applicant's claimed reaction process to retain catalyst activity and reaction product specificity. Gilbeau would have instructed persons having ordinary skill in the art to control the pH during its catalyst regeneration treatment to prevent corrosion of the equipment used for the treatment, to prevent attack on the binder by acids released during the treatment, and to limit the decomposition of the oxidizing agent by metals released during the treatment (Gilbeau, col. 3, ll. 26-43). The only reasonable suggestion to control and maintain pH within the range of 1.5 to 4.8 during the process for producing 1,2-epoxy-3-chloropropane of record appears in Applicant's own Specification.

The Examiner seemingly acknowledges that WO 99/48882, dated September 30, 1999; EP 1,072,600, dated January 31, 2001; and EP 1,085,017, dated March 21, 2001, all of record, teach away from the process Applicant claims (Ans., p. 6, the paragraph starting with B.). Each reference teaches that reducing the pH of the reaction medium during the reaction of allyl chloride and hydrogen peroxide in the presence of a zeolite catalyst to a value in the range recited in Applicant's claims substantially decreases the selectivity of the epoxidation reaction. In WO 99/48882, a decrease in pH from 5.5 to 4.0 significantly decreased reaction selectivity (Examples 1 and 2). In EP 1,072,600, a pH of 6.0 significantly improved the reaction selectivity and the rate of conversion of hydrogen peroxide (Example 3) as compared to the reaction selectivity and rate of conversion of hydrogen peroxide at a pH of 4.5 (Example 2). In EP 1,085,017, a decrease in pH from 5.46 to 4.39 decreased the reaction selectivity. To no avail, the Examiner argues that he "properly made a prima facie case of obviousness . . . over Srebelle . . . in view of Nakanishi . . . and Gilbeau . . ." (Ans., p. 6). The error is particularly egregious because, after having been informed that it is improper to selectively consider evidence which favors unpatentability and disregard evidence to the

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contrary, the Examiner continues the error. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984).

The evidence favoring patentability in this case far outweighs the evidence to the contrary. The evidence presented on pages 7-9 and in Tables 1-2 of Applicant's Specification of record shows that the claimed process wherein pH is "controlled and maintained at a value of greater than or equal to 1.5 and less than 4.8" results in unexpected retention of high selectivity in the epoxidation reaction without decreasing the rate of conversion of the hydrogen peroxide. See Tables 1 and 2 on page 8 of the Specification (reproduced on page 7 of the Answer). There Examples 1 and 3 with pH regulation are compared to Examples 2 and 4 without pH regulation. The results show the positive effect pH adjustment has on the selectivity of the epoxidation reaction while the rate of conversion of the hydrogen peroxide remains substantially the same for a much greater period of time.

The Examiner finds no significant difference in reaction specificity and conversion rates for the processes with and without pH control (Ans., p. 7-8, bridging ¶). The Examiner does find that the time differences over which the conversion rates were maintained in Examples 3 and 4 are significantly different. However, the Examiner misinterprets the results and unjustifiably finds that persons having ordinary skill in the art would prefer to maintain the same conversion rates over shorter periods of time. In that light, Applicant asks why persons having ordinary skill in the art would ever have considered using Gilbeau's catalyst regeneration treatment to extend the life of a catalyst at all?

2. The rejection of Claim 15 under 35 U.S.C.
§ 103(a) over Strebel in view of Nakanishi and Gilbeau

Applicant independently appeals the rejection of Claim 15 under 35 U.S.C. § 103(a) over Strebel in view of Nakanishi and Gilbeau. Claim 15 is argued separately because the Specification teaches that Applicant's claimed process may be less satisfactory, less effective,

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and less preferred at reaction temperatures outside the range of 45 to 80°C (Spec., p. 5, ll. 19-27). Less satisfactory does not mean unsatisfactory. Less effective does not mean ineffective. The Specification teaches that controlling and maintaining pH “at a value of greater than or equal 1.5 and less than 4.8” preferably at temperatures from 45 to 80°C as required by dependent Claim 15 most advantageously improves both the reaction selectivity and catalytic activity. Consistent with the Specification’s preferences, and in accordance with Claim 15, Examples 1 and 3 were performed with pH regulation at a reaction temperatures of 55°C in Example 1 (Spec., p. 7, ll. 25-33) and 65°C in Example 3 (Spec., p. 8, ll. 6-11).

Examples 5 and 6 were performed without regulating pH (Spec., p. 9, and Table 3). Example 5 was performed at a reaction temperature of 35°C, and Example 6 was performed at a reaction temperature of 55°C (Spec., p. 9, ll. 1-18, and Table 3). As can be seen from the data in Table 3, an increase in the reaction temperature from 35°C in Example 5 to 55°C in Example 6 without regulating pH reduces product selectivity even though the duration of catalytic activity is improved.

However, when the pH is regulated and the reaction temperature is maintained at 65°C as in Example 3 and Claim 15, the product selectivity is excellent and the duration of catalytic activity is improved as shown in Table 2 (Spec., p. 8, ll. 6-13, and Table 2). On the other hand, Table 2 also reports that Example 4, wherein the reaction temperature is maintained at 55°C but the pH is not regulated (Spec., p. 8, l. 14, and Table 2), showed high product selectivity but a substantial reduction in the duration of catalytic activity.

The Examiner appears to have misunderstood Applicant’s arguments regarding the independent patentability of Claim 15. The Examiner finds that the prior art discloses reaction temperatures from 20 to 80°C (Ans., pp. 7-8). The Examiner concludes therefrom that a prima facie case of obviousness has been established for any narrower temperature

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range within the broadly disclosed temperature range irrespective of the evidence of unexpected results reported in the Specification for temperatures in the narrower range of 45 to 80°C recited in Claim 15.

Once again, this time specifically with regard to the preferred invention of Claim 15, the Examiner erroneously disregards additional evidence of record favoring patentability. For that reason alone, the Examiner's rejection of all Applicant's claims, especially the rejection of Claim 15, should be reversed.

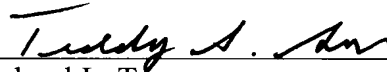
CONCLUSION

For the reasons stated herein:

1. The rejection of Claims 11-26 under 35 U.S.C. § 103(a) as unpatentable over Strebelle in view of Nakanishi and Gilbeau should be REVERSED; and
2. The rejection of Claim 15 under 35 U.S.C. § 103(a) as unpatentable over Strebelle in view of Nakanishi and Gilbeau should be REVERSED.

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